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# THE NATIONAL COOPERATIVE DAIRY HERD IMPROVEMENT

# AND

# SIRE PROVING PROGRAMS

An Explanation of Their Operation and Their Importance to the Dairy Farmer



Agricultural Research Service
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CONTENTS



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# THE NATIONAL COOPERATIVE DAIRY HERD IMPROVEMENT AND SIRE PROVING PROGRAMS

## Summary

The National Cooperative Dairy Herd Improvement and Sire Proving Programs were developed by the several State extension services and the U.S. Department of Agriculture in cooperation with the American Dairy Science Association.

The costs of the programs are paid by dairymen and State and Federal agencies. Dairymen's fees for on-the-farm services amount to more than $10 million annually. State and Federal funds are used to assist in the direction, coordination, research, and education aspects of the programs. The USDA also has responsibility for operating the national sire proving program.

The objective of the National Cooperative Dairy Herd Improvement Program (DHIA) is to improve the efficiency of the Nation's dairy herds by providing records with which dairymen can cull low-producing cows, feed each cow economically according to her production, and select the best animals in their herds from which to raise replacements. The program offers three recordkeeping plans: (1) Standard DHIA, (2) Owner-Sampler, and (3) Weigh-a-Day-a-Month. These plans provide services to meet the differing needs of dairymen for records.

The DHIA program is a tremendous factor in improving the milk-producing efficiency of dairy herds. The three recordkeeping plans reach nearly 70,000 dairymen and include about 2,600,000 cows. In 1961, cows enrolled in the DHIA program produced an average of 10,796 pounds of milk as compared to 6,780 for the average of other cows in the United States.

The location of superior bulls for use by dairymen and in artificial insemination organizations depends very largely on DHIA records. The identification of superior sires requires production records on the daughters of each available sire and prompt and accurate evaluation of the records. Superior cows to produce future bulls cannot be selected without extensive testing.

The objective of the National Cooperative Sire Proving Program is to identify superior dairy sires that will improve the productive efficiency of the Nation's dairy cattle. The program uses records from DHIA herds to estimate the sires' inherited ability to sire efficient, high-producing daughters. This estimate is based on comparisons of each sire's daughters to the production of other daughters in the same herd at the same time.

The rapid adoption of the use of artificial insemination for dairy cattle has greatly increased the need for the national sire evaluation program because (1) fewer sires are being used to breed the Nation's cows; and (2) records used for evaluating a sire need to be assembled from nationwide sources.

The USDA is now handling nearly seven times as many records in the sire evaluation program as it handled in 1947. The work of assembling, processing, evaluating, and publishing sire information for use by the industry is an increasingly costly task.

Increased efficiency in production is essential to the maintenance of dairying's competitive position as a farming enterprise and in the food-producing industry. Greater participation by dairymen in the recordkeeping plans is required if needed improvements in efficiency are to be attained. Despite the growth of the DHIA program, production records are kept on less than 15 percent of the cows in the U.S. dairy herd. This contrasts sharply with 66 percent in the Netherlands and 59 percent in Denmark.

Recommendations for increasing participation by dairymen in recordkeeping include (a) further increasing the variety of testing services available and (b) expanding the information provided on evaluations of herd management practices and combining these evaluations in a meaningful way with cost records.

The dairy herd improvement and sire evaluation programs are vital to continued progress in the efficiency and profit-making ability of the Nation's dairy producers. The identification and use of superior sires is the most effective procedure known for improving the inherited efficiency of the U.S. dairy herd. Research and development of herd-management records in addition to production testing will provide dairymen with a complete picture of their operations and permit them to make needed adjustments in their practices based on factual appraisals.

The role of the USDA is to provide services which the States and the dairymen cannot provide. The assistance of the USDA is unquestionably needed in the sire evaluation effort. Also, the USDA can make a major contribution to the future of both the DHIA and sire evaluation programs by participating in and providing leadership for research related to (a) continued improvement of sire evaluation procedures and (b) development of reliable on-the-farm techniques for evaluating dairy herd management practices. The research should include cooperative studies with State experiment stations.

Recognizing the economic importance of obtaining production records on dairy cows, the several State extension services and the U.S. Department of Agriculture, in cooperation with the American Dairy Science Association, have developed a cooperative national production recording program. It has been in operation for more than 50 years. Known as the DHIA program it is available to farmers in every State and county.

The DHIA program enables groups of dairymen in a community to join together to have the milk and butterfat production of their cows measured at monthly or bimonthly intervals. It provides records on feed consumption and on certain herd-management practices and records for evaluating sires in the National Cooperative Sire Proving Program.

The operating costs of the program are paid by dairymen. Fees paid by dairymen amount to more than $10 million annually. They defray almost entirely the cost of testing on the farm and computing records used directly by the farmer. State and USDA funds are used to assist in the direction, coordination, research, and education aspects of the effort. The USDA also has responsibility for operating the national sire proving program.

As of January 1, 1961, 69,419 herds consisting of 2,594,201 cows were enrolled in DHIA. The growth and status of the program is shown in table 1.

Table 1. - Participation in DHIA and average production of cows on standard DHIA test, 1930-61

| Year | Extent of DHIA program | | Average production per cow | | | |
|---|---|---|---|---|---|---|
| | | | Standard DHIA cows | | Other U.S. cows | |
| | Herds | Cows | Milk | Fat | Milk | Fat |
| | Number | Number | lbs. | lbs. | lbs. | lbs. |
| 1930 | 27,888 | 507,549 | 7,642 | 303 | 4,435 | 174 |
| 1940 | 27,948 | 676,141 | 8,133 | 331 | 4,519 | 179 |
| 1950 | 40,100 | 1,088,872 | 9,172 | 370 | 5,113 | 202 |
| 1961 | 69,419 | 2,594,201 | 10,796 | 418 | 1/6,780 | 1/254 |

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The DHIA program is an important factor in improving the efficiency of dairy herds. Table 1 shows that average production in DHIA herds is about 4,000 pounds of milk per cow more than the average for other U.S. cows. Production records provide the basis for culling low-producing unprofitable cows, feeding each cow in the most economical way according to her production, and selecting the best animals from which to raise replacements.

The DHIA program is also important because the location of superior bulls for use by dairymen, and in artificial insemination organizations, depends on the availability of production records. The identification of superior sires requires production records on the daughters of each available sire and prompt and accurate evaluation of the records. The selection of superior cows to produce future sires cannot be carried out without extensive production testing. The selection of AI sires and their contribution toward increasing the productive efficiency of the 800,000 herds they service would not be possible without DHIA records and sire provings.

The nationwide program includes three recordkeeping plans: The first is the Standard DHIA plan in which the local dairy-herd-improvement association employs a supervisor who visits each farm 1 day each month to weigh and sample milk from each cow. He may also weigh the grain fed each cow and the roughage fed the herd.

In some associations the Standard DHIA supervisor tests the milk and calculates production and feed records; in other associations, the testing and calculation are carried out in a central laboratory and office. The records are entered in the dairyman's herd-record book. They include production-to-date, monthly and year-to-date herd totals, individual and herd feed consumption and feed costs. Identification records are maintained. Only the production records made under this plan are used for evaluating sires in the National Sire Proving Program.

The second plan is called Owner-Sampler. In this plan, the supervisor leaves sample bottles and record sheets at the farm 1 day each month. The owner weighs the milk of each cow and takes a sample for butterfat testing. The samples are tested and the records calculated either by the supervisor or in a central office. The dairyman receives monthly and yearly reports, which provide complete records of each cow and of the herd. The herd owner may also record amounts of feed fed and have these included in his records.

Weigh-a-Day-a-Month is the third plan. The dairyman weighs each cow's milk once a month, records the weight on forms provided, and mails the weights to a central office. He may also send in herd feed weights. Milk records for each cow for the month, production-to-date, monthly herd records, year-to-date herd totals, and feed records are calculated and returned to the dairyman.

The number of herds and cows enrolled in each plan January 1, 1961, is indicated in table 2.

Table 2. - Participation in DHIA recordkeeping plans, January 1, 1961

| Plan | Dairymen | Cows |
|---|---|---|
| | Number | Number |
| Standard DHIA | 42,558 | 1,867,469 |
| Owner-Sampler | 24,498 | 655,885 |
| Weigh-a-Day-a-Month | 2,363 | 70,847 |
| Total | 69,419 | 2,594,201 |

In the past several years, there has been an active effort to modernize DHIA recording methods. Calculation of individual cow data collected each month is being centralized in State or regional offices. Electronic data processing procedures are used. Such services are now conducted at 10 computing centers and are utilized at least partially by 49 States. Approximately 30 percent of all records in the program are now computed by these methods. Continuing expansion in the acceptance and use of these methods is expected. The new methods make it possible to provide dairymen with more accurate and inclusive information than can be provided by manual calculation and recording. The accuracy of electronic data processing has made possible the formation of a Dairy-Herd-Improvement Registry in which, under certain conditions, DHIA records on purebred cattle are accepted by the breed associations for use in their activities. In addition to providing information which benefits cooperating dairymen, the DHIA program is the basis or foundation upon which State Extension Services and the USDA develop educational activities in which all dairymen may participate. In other words, the DHIA program provides information of value to the entire dairy industry, not just to the 70,000 members.

## The National Cooperative Sire-Proving Program

In order to identify sires that have superior inheritance for production, a nationwide sire proving program was started in 1935. Records for the sire summaries are obtained from herds on the Standard DHIA plan. They are forwarded on a voluntary basis by the local associations through the

State extension services of all States to the Dairy Cattle Research Branch of the USDA at Beltsville, Md. Utilizing modern machinery for electronic data processing, the USDA evaluates the transmitting ability of all sires used in DHIA herds by comparing the production of each sire's daughters to the production of daughters of other sires producing in the same herd at the same time.

The growth of the sire proving program can best be illustrated by showing the number of records processed during the past several years. These data are shown in table 3.

Table 3. - Records processed by USDA in the national cooperative sire proving program, 1947 and 1953-61

| Year | Records received for evaluating sires |
|---|---|
| | Number |
| 1947 | 183,000 |
| 1953 | 501,582 |
| 1954 | 667,074 |
| 1955 | 636,293 |
| 1956 | 658,086 |
| 1957 | 565,360 |
| 1958 | 786,496 |
| 1959 | 927,998 |
| 1960 | 886,495 |
| 1961 | 1,084,799 |

The USDA expects to process 1,250,000 records in 1962. This is nearly 7 times the amount of data processed in 1947 and it is being handled with less than one-forth as many employees. Use of electronic data processing and adoption of other practices that increased efficiency have helped make this possible. However, because of the increasing size of the program, a reduction from monthly to annual publication of sire information has been necessary.

## Present Needs of the DHIA and Sire Proving Programs

Increased efficiency in production practices is essential if dairying's competitive position as a farming enterprise and in the food-producing industry is to be maintained. Forecasts of dairying emphasize the prospects of change in market demands, in other economic developments, and in production technology.

If dairymen are to operate with the needed efficiency and adjust to changing demands, they must have performance and management records that will give them a continuous appraisal of their operations.

These needs of dairymen in the future will require greater participation in recordkeeping programs than at present. The 2,600,000 cows on which production records are being obtained represent less than 15 percent of

the 17,500,000 cows in the U.S. dairy herd. This percentage contrasts sharply with the 66 percent of cows on test in the Netherlands, 59 percent in Denmark, 32 percent in West Germany, and 28 percent in Great Britain.

One of the promising ways for increasing participation in recordkeeping is to increase the kinds of testing services or modify existing kinds to make the services more adaptable to the needs of individual dairymen. Many dairymen want a program less demanding in requirements than Standard DHIA. They are interested only in within-herd uses of information of their own choosing. The Owner-Sampler and Weigh-a-Day-a-Month plans also fail to meet their needs because they do not want to keep the records themselves.

A second promising approach to increasing participation in recordkeeping is to expand the information provided. Dairymen are asking for, and using where available, expanded record systems that include data on feeding and management in addition to production records so that they will have a continuous supply of "business analysis" information on their herds. Feed information has long been a part of DHIA recording, but the usefulness of feed records has been limited. Contributing to the limitations has been the difficulty in obtaining reliable measurements of quantity and quality of feed used on a farm. Also, the processing of feeding data into useful form was practically impossible with manual data processing methods. The adoption of electronic data processing to dairy recordkeeping in the State and regional computing centers has eliminated this obstacle. Nevertheless, serious inaccuracies in gathering feeding information still exist and considerable research is needed on developing and evaluating measurement techniques for this purpose. Additional measures for other herd management practices that can be definitely related to economic efficiency must be developed. Studies on these measures will require closely coordinated efforts between husbandmen and economists. Their pursuance, however, can result in providing dairymen with specific guides for making needed adjustments in their operations.

Such management evaluations can also be of real assistance to dairymen in adjusting their practices and rations according to changes in home-grown feed supplies, in feed prices, in milk prices, in feed to milk price ratios and other changing conditions. In addition, the recordkeeping program must be capable of adjusting to new market demands, such as emphasis on solids-not-fat and protein constituents of milk. One European country is already paying for protein as well as for butterfat content. The emphasis on solids-not-fat in England is considerably greater than in this country. Some States have made provision to include information on these constituents in their programs. Still other constituents and characteristics of milk, such as flavor-producing components, may also require herd and individual cow evaluations in the future.

The growth in importance of recordkeeping and of the nationwide sire evaluation program is being accelerated by developments in the AI industry. Before AI techniques were available, a single bull could service 50 to 100 cows per year. Today, in AI, the average sire services 2,800 cows. In organizations that use frozen semen, some bulls service 20,000 to 30,000 cows. For this reason, the influence of a single sire is expanding rapidly and the need to reliably identify superior sires is becoming more and more important.

Another aspect of AI which adds to the dependence of the industry on the sire evaluation work of the USDA is the use of a single sire in different parts of the country. Obtaining a reliable indicator of the transmitting ability of these bulls requires assembling records on the production of their daughters from many States and regions. The USDA necessarily must assemble the data from nationwide sources and is, therefore, able to provide the needed summaries.

## Role of USDA in the Programs

Historically, the USDA has been strong in leadership and yet flexible in its participation in the national recordkeeping and sire evaluation programs. It has provided direct leadership and cooperative guidance in forming local testing associations, providing record forms, and designing herd record books. For years, four Federal extension men assisted with the promotional and educational phases of the effort throughout the country. This DHIA activity of the USDA extension service continued until the State extension services were in a position to provide the needed assistance. Today, dairy extension leadership in the USDA is directed toward developing the total dairy educational program, using DHIA as the basis. Acceptance in 1935 of responsibility for conducting the national sire proving program reflects the continuing adaptation of the USDA's assistance in accordance with changing needs.

The future role of the USDA should be one of continuing to provide the guidance and leadership for the overall program and those services which the individual States and the dairymen cannot provide. The impact of providing information for identifying and selecting superior sires is nationwide. It is the most effective procedure known today for improving the inherited efficiency of the Nation's dairy herd. The USDA must continue to provide the coordinating guidance and perform the sire evaluation function since no State or regional agency is in a position to do this work effectively. By keeping such services to a minimum, however, expansion of the USDA effort can be concentrated on research and development which will anticipate and help determine the future growth and efficiency of the program.

The increasing importance of sire information accents the need for frequent evaluations and prompt issuance of summaries. Delay in the identification of superior sires reduces the extent to which their services can be utilized. Leaders of the AI industry as well as individual dairymen have

repeatedly indicated the necessity of at least two sire-evaluation reports per year. The USDA at present can provide only annual evaluation reports.

The USDA can also make a major contribution to the future progress of the program by organizing, coordinating, and conducting research needed to insure continuing progress in the sire evaluation program. The recent change from daughter-dam comparisons for evaluating sires to daughter-herd-mate comparisons was based on the application of research results. Still other new genetic findings must be tested for their usefulness in practical sire selection. Unsolved problems of even the improved procedures need further study. For example, new technological advances have resulted in providing greatly improved evaluations for sires used in AI, but have not resulted in the same degree of improvement in the evaluation of sires used in a single herd. Additional research is needed to remove the disparity between the two types of evaluations.

The USDA should provide leadership for research to develop reliable on-the-farm techniques for evaluating herd management practices and combining them in a meaningful way with cost information. Through the records obtained, dairymen could be provided with periodic recommendations for balanced, economical rations based on the quality and quantity of their feed inventory. They could obtain evaluations on the efficiency of their labor-saving equipment in terms of manpower requirements and cost. Time and motion studies could be provided to evaluate their organization and use of labor, including their own time, in their herd management operations. Periodic checks could be provided on milking machines to insure their efficient performance and to minimize costly flareups of mastitis resulting from machine injury to the udder. These are only a few examples of records that could be developed to present dairymen with a complete picture of their operations, and permit them to make needed adjustments based on factual appraisals.

This research requires the joint effort of both husbandmen and economists. It involves not only studies by the USDA but also cooperative work with State experiment stations, to explore and develop the application of techniques to farming systems in various areas of the country. One of the functions of the USDA is to provide a focal point for the development of projects to cover a nationwide effort, for the exchange of information and research results among various participants, and for the distribution of results to agencies which may implement their application.